Thurrock Flexible Generation Plant

Environmental Statement Volume 6
Appendix 11.3: Construction Noise Assessment Methodology and Results

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Environmental Impact Assessment

Environmental Statement

Volume 6

Appendix 11.3

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Table of Contents

1. Construction Noise 1
1.1 Calculations and Modelling 1
1.2 Results 4
1.3 Summary of results 4
2. Construction Traffic 6
2.1 Calculations and modelling 6
2.2 Results 8
2.3 Summary of results 9
3. References 10

List of Tables

Table 1.1: General activity within site compounds - assumed plant list. 1
Table 1.2: Construction of haul roads - assumed plant list. 2
Table 1.3: Site clearance - assumed plant list. 2
Table 1.4: Earthworks and foundations - assumed plant list. 2
Table 1.5: Piling – assumed plant list. 2
Table 1.6: Trenching for gas pipeline – assumed plant list. 3
Table 1.7: HDD drilling for gas pipeline – assumed plant list. 3
Table 1.8: Installation of plant items – assumed plant list. 3
Table 1.9: Erection and fit-out of buildings and enclosures – assumed plant list. 3
Table 1.10: Construction of above ground gas compound – assumed plant list. 3
Table 1.11: On-site HGV movements (per zone) – assumed plant list. 3
Table 1.12: Construction of the causeway – assumed plant list. 4
Table 1.13: Predicted noise levels from construction activities at the façade of most affected receptor. 4
Table 2.1: Road links considered within construction traffic noise assessment. 6
Table 2.2: Traffic flow data – 2022 base year without construction. 7
Table 2.3: Traffic flow data – 2022 base year with peak construction flows. 7
Table 2.4: Traffic flow data – 2022 base year with peak construction and cumulative flows. 7
Table 2.5: Predicted noise change – 2022 base year with no construction against base year with peak construction flows - daytime. 8
Table 2.6: Predicted noise change – 2022 base year with no construction against base year with peak construction flows – night-time. 8
Table 2.7: Predicted noise change – 2022 base year with no construction against base year with peak construction and cumulative flows – daytime. 9
Table 2.8: Predicted noise change – 2022 base year with no construction against base year with peak construction and cumulative flows – night-time. 9

Summary

This appendix provides supporting information on the assessment methodology and modelling results regarding construction noise impacts associated with Thurrock Flexible Generation Plant. Discussion of the results presented within this appendix, is presented in Volume 3, Chapter 11: Noise and Vibration.

Qualifications

This document has been prepared by Charlotte Birch, an Acoustic Consultant and full Member of the Institute of Acoustics, who has two years' experience of environmental noise impact assessment.

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1. Construction Noise

1.1 Calculations and Modelling

Noise source data & noise model methodology

1.1.1 Information on the construction phasing is presented in Volume 2, Chapter 2: Project Description. It is understood that construction will be split into 3 phases, with each phase lasting up to 18 months. Therefore, for the purpose of this assessment, unless specifically stated, each activity is considered to be of longer than one month duration.

1.1.2 The assessment has been undertaken based on the maximum design envelope parameters summarised in Volume 3, Chapter 11: Noise and Vibration.

1.1.3 The following activities have been modelled in the assessment of construction noise impact:

- general activity within site compounds within Zones C and D3;
- construction of haul roads within Zone G;
- site clearance within Zone A;
- earthworks and foundations within Zone A;
- piling within Zone A;
- trenching for gas pipelines within Zones C, D1 and D2;
- Horizontal Directional Drilling (HDD) drilling for gas pipeline under water courses and hedges within Zone C;
- installation of plant items within Zone A;
- erection and fit-out of buildings and enclosures within Zone A;
- construction of above ground gas compound within Zone D3;
- Heavy Goods Vehicle (HGV) movements on the access road within Zone H; and
- construction of causeway within Zone G.

1.1.4 Activities have been modelled in multiple positions across the associated zones in order to determine the greatest noise impact upon the surrounding receptors.

1.1.5 It is assumed that during the peak construction period there will be a maximum peak flow of 60 heavy goods vehicles (HGV) movements per day. For the purpose of the noise assessment, HGV movements have been split across construction Zones A, C, D and G.

1.1.6 Large and abnormal loads related to the construction of the development are proposed to be delivered via barge on the River Thames to the causeway within Zone G, with a total of 60 delivery barges arriving at intervals no more frequent than one per three day period. Due to the low number of movements and the pre-existing heavy river traffic masking any additional noise due to the development, this is not predicted to be a significant source and has therefore been scoped out of this assessment.

1.1.7 Land movements of the abnormal loads have likewise been scoped out of this assessment. There are a total of 60 abnormal indivisible load deliveries proposed over the duration of the construction. Due to the low number, and the distance from the proposed route and the closest receptors, it is not anticipated that the movement of abnormal indivisible loads will have any additional contribution to construction noise levels.

1.1.8 Details on the assumed plant items used within the noise model for each activity is presented in Table 1.1 to Table 1.12.

Table 1.1: General activity within site compounds - assumed plant list.

Plant description	Data source	Sound pressure level at 10 m (dB L_{Aeq})	Number	Percentage on-time	Height (m)	Sound power level (dB L_w)
Portable generators	BS 5228-1 Table C.4 #85 Diesel Generator (4 kW, 18 kg)	66	1	100	1	94
Dumper trucks (empty)	BS 5228-1 Table C.2 #33 Articulated Dump Truck (187 kW, 23 t)	81	1	50	1.5	109
Dumper trucks (tipping fill)	BS 5228-1 Table C.2 #32 Articulated Dump Truck (187 kW, 23 t)	74	1	50	1.5	102
Road Sweeper	BS 5228-1 Table C.4 #90 Road Sweeper (70 kW)	76	1	50	1.5	104

Table 1.2: Construction of haul roads - assumed plant list.

Plant description	Data source	Sound pressure level at 10 m (dB L_{Aeq})	Number	Percentage on-time	Height (m)	Sound power level (dB L_w)
Dumper trucks (empty)	BS 5228-1 Table C.2 #33 Articulated Dump Truck (187 kW, 23 t)	81	1	50	1.5	109
Dumper trucks (tipping fill)	BS 5228-1 Table C.2 #32 Articulated Dump Truck (187 kW, 23 t)	74	1	50	1.5	102
JCB	BS 5228-1 Table C.2 #8 Backhoe Loader (62 kW, 8 t)	68	2	50	1.5	96
Compactor	BS 5228-1 Table C.2 #37/38 Roller (145 kW, 18 t)	79	2	25	1.5	107

Table 1.3: Site clearance - assumed plant list.

Plant description	Data source	Sound pressure level at 10 m (dB L_{Aeq})	Number	Percentage on-time	Height (m)	Sound power level (dB L_w)
Portable generators	BS 5228-1 Table C.4 #85 Diesel Generator (4 kW, 18 kg)	66	1	100	1	94
JCB	BS 5228-1 Table C.2 #8 Backhoe Loader (62 kW, 8 t)	68	2	50	1.5	96
Dumper trucks (empty)	BS 5228-1 Table C.2 #33 Articulated Dump Truck (187 kW, 23 t)	81	3	50	1.5	109
Dumper trucks (tipping fill)	BS 5228-1 Table C.2 #32 Articulated Dump Truck (187 kW, 23 t)	74	1	50	1.5	102
Compactor	BS 5228-1 Table C.2 #37/38 Roller (145 kW, 18 t)	79	2	25	1	107

Table 1.4: Earthworks and foundations - assumed plant list.

Plant description	Data source	Sound pressure level at 10 m (dB L_{Aeq})	Number	Percentage on-time	Height (m)	Sound power level (dB L_w)
360 excavator idling	BS 5228-1 Table C.2 #6 Tracked Excavator (72 kW, 16 t)	63	2	50	1.5	91
Dumper trucks (idling)	BS 5228-1 Table C.4 #5 Dumper (75 kW, 9 t)	63	2	50	1.5	91
Ready mix delivery (discharging)	BS 5228-1 Table C.4 #18 Cement Mixer Truck	75	2	25	1.5	103
Ready mix delivery (idling)	BS 5228-1 Table C.4 #19 Cement Mixer Truck	71	2	25	1.5	99
Telehandler	BS 5228-1 Table C.4 #54 Telescopic Handler (76 kW, 4 t)	79	2	50	1.5	107

Table 1.5: Piling – assumed plant list.

Plant description	Data source	Sound pressure level at 10 m (dB L_{Aeq})	Number	Percentage on-time	Height (m)	Sound power level (dB L_w)
Piling rig	BS 5228-1 Table C.3 #2 Hydraulic Hammer Rig (186 kW, 4 t)	87	1	75	1.5	115
Concrete delivery Lorries	BS 5228-1 Table C.11 #14 Lorry (254 kW, 32 t)	79	1	25	1.5	107
Vibration compaction plant	BS 5228-1 Table C.5 #29 Vibratory compactor (asphalt) (3 kW, 60 kg)	82	1	50	1	110
Compressor	BS 5228-1 Table C.5 #5 Compressor for hand held pneumatic breaker (1 t)	65	1	25	1	93
JCB	BS 5228-1 Table C.2 #8 Backhoe Loader (62 kW, 8 t)	68	1	50	1.5	96

Table 1.6: Trenching for gas pipeline – assumed plant list.

Plant description	Data source	Sound pressure level at 10 m (dB L_{Aeq})	Number	Percentage on-time	Height (m)	Sound power level (dB L_w)
360 excavator	BS 5228-1 Table C.2 #6 Tracked Excavator (72 kW, 16 t)	63	1	50	1.5	91
Dumper trucks (idling)	BS 5228-1 Table C.4 #5 Dumper (75 kW, 9 t)	63	2	50	1.5	91

Table 1.7: HDD drilling for gas pipeline – assumed plant list.

Plant description	Data source	Sound pressure level at 10 m (dB L_{Aeq})	Number	Percentage on-time	Height (m)	Sound power level (dB L_w)
Drilling rig (advanced grouting)	BS 5228-1:2009+A1:2014 Table C.6 #35 tracked hydraulic drilling rig	86	1	80	1.5	114

Table 1.8: Installation of plant items – assumed plant list.

Plant description	Data source	Sound pressure level at 10 m (dB L_{Aeq})	Number	Percentage on-time	Height (m)	Sound power level (dB L_w)
Telehandler	BS 5228-1 Table C.4 #54 Telescopic Handler (76 kW, 4 t)	79	2	50	1.5	107
Crane	BS 5228-1 Table C.3 #28 Tracked mobile crane (184 kW, 110 t)	67	1	50	1.5	95

Table 1.9: Erection and fit-out of buildings and enclosures – assumed plant list.

Plant description	Data source	Sound pressure level at 10 m (dB L_{Aeq})	Number	Percentage on-time	Height (m)	Sound power level (dB L_w)
Telehandler	BS 5228-1 Table C.4 #54 Telescopic Handler (76 kW, 4 t)	79	2	50	1.5	107
Scissor lift	BS 5228-1 Table C.4 #59 Diesel scissor lift	78	2	50	1.5	106

Table 1.10: Construction of above ground gas compound – assumed plant list.

Plant description	Data source	Sound pressure level at 10 m (dB L_{Aeq})	Number	Percentage on-time	Height (m)	Sound power level (dB L_w)
Telehandler	BS 5228-1 Table C.4 #54 Telescopic Handler (76 kW, 4 t)	79	1	50	1.5	107
Scissor lift	BS 5228-1 Table C.4 #59 Diesel scissor lift	78	1	50	1.5	106
360 excavator	BS 5228-1 Table C.2 #6 Tracked Excavator (72 kW, 16 t)	63	1	50	1.5	91

Table 1.11: On-site HGV movements (per zone) – assumed plant list.

Plant description	Data source	Sound pressure level at 10 m (dB L_{Aeq})	Number	Percentage on-time	Height (m)	Sound power level (dB L_w)
Lorry	BS 5228-1 Table C.6 #21 Road Lorry Full - 39t	80	10	10	1.5	108

Table 1.12: Construction of the causeway – assumed plant list.

Plant description	Data source	Sound pressure level at 10 m (dB L_{Aeq})	Number	Percentage on-time	Height (m)	Sound power level (dB L_w)
360 excavator	BS 5228-1 Table C.2 #6 Tracked Excavator (72 kW, 16 t)	63	1	50	1.5	91
Dumper trucks (idling)	BS 5228-1 Table C.4 #5 Dumper (75 kW, 9 t)	63	2	50	1.5	91
Grab Hopper Dredging Ship	BS 5228-1 Table C.7 #2 Grab Hopper Dredging Ship (2461 kW)	92	1	50	4	110

1.2 Results

Construction noise

1.2.1 The predicted noise levels from the proposed construction activities are presented in Table 1.13 below. The highest predicted noise level at the most affected receptor for each activity is presented. Noise impact from construction activity on ecological receptors has been addressed within Volume 3, Chapter 9: Onshore Ecology.

Table 1.13: Predicted noise levels from construction activities at the façade of most affected receptor.

Construction activity	Receptor	Predicted noise level (dB $L_{Aeq,T}$)
Earthworks and foundations within Zone A	Havers Lodge	42
Erection and fit-out of buildings and enclosures within Zone A	Havers Lodge	45
Installation of plant items within Zone A	Havers Lodge	40
Piling within Zone A	Havers Lodge	46
Site clearance within Zone A	Havers Lodge	42
General activity within site compounds within Zone C	Walnut Tree Farm	55
HDD drilling for gas pipeline under water courses and hedges within Zone C – Location 1	Havers Lodge	51
HDD drilling for gas pipeline under water courses and hedges within Zone C – Location 2	Walnut Tree Farm	55
Trenching for gas pipelines within Zones C	Walnut Tree Farm	45
General activity within site compounds within Zones D1, D2 & D3	Oak Lodge	51
Trenching for gas pipelines within Zones D1 & D2	Goshems Farm	35
Construction of above ground gas compound within Zone D3	Oak Lodge	49
Construction of haul roads within Zone G	Havers Lodge	35
Construction of the causeway within Zone G	Clarendon Road	31
HGV traffic on access road within Zone H	Byron Gardens	23

1.3 Summary of results

1.3.1 During the construction phase, predicted noise levels at the most affected receptors during all proposed construction activities will be below the lower cut-off value during the day as given in BS 5228:2009+A1:2014. Predictions have shown that the highest noise levels are 55 dB $L_{Aeq,T}$, predicted at Walnut Tree Farm due to general activities and HDD drilling within Zone C. All other construction activities would result in predicted noise levels of below 51 dB $L_{Aeq,T}$ at the most affected receptors for that activity.

1.3.2 The highest predicted noise level at the closest residential receptor on the southern bank of the River Thames is 31 dB L_{Aeq} during the construction of the causeway within Zone G. Receptors in this area have been identified as a cause for concern, but incident levels are far below the lower cut-off value during the day as given in BS 5228:2009+A1:2014.

1.3.3 In accordance with the maximum design envelope parameters for this assessment, construction working hours are considered as normal daytime working hours of Monday to Friday 08:00 to 18:00, and Saturday 08:00 to 13:00. Whilst certain activities may require continuous operation throughout the 24 hour period, such as HDD drilling and concrete pouring, these activities are limited to a continuous operation of no more than 10 days per phase. As such, in accordance with BS 5228:2009+A1:2014, activities of less than one month in duration are considered to result in a negligible impact, unless works of a shorter duration are likely to result in significant effect.

1.3.4 The determination of magnitude of impact at the identified receptors from proposed construction activity and corresponding significance is detailed in Volume 3, Chapter 11: Noise and Vibration.

2. Construction Traffic

2.1 Calculations and modelling

2.1.1 Road traffic on the public highway has been modelled using a noise change procedure based on the methodology in the 'Calculation of Road Traffic Noise' (CRTN) (Department for Transport, 1988). This considers the increase in noise from individual road links, based on the change in flow, speed and HGV composition. Within the assessment, HGVs and heavy duty vehicles (HDVs) are regarded as having comparable noise emissions.

2.1.2 Traffic data has been provided for 12 links around the proposed development, as detailed in Table 2.1. The study area has been limited to those receptors for whom traffic on those links is, or could become, the dominant noise source. For receptors for which this is not the case, any change in noise arising from these road links will not have any significant change in their noise environment. The location of the road links that have been assessed are shown in Volume 3, Chapter 10: Traffic and Transport.

Table 2.1: Road links considered within construction traffic noise assessment.

Link ID	Road/Link Description
1	A13 between M25 junction 30 and A126
2	A13 between A126 and A1012
3	A13 between A1089 and A1012
4	A1089, between Marshfoot Road roundabout and A13
11	Coopers Shaw Road / Church Road / Station Road, between Gun Hill Road and EMR East Tilbury junction
15	A13, between Orsett Cock roundabout and A1089
16	A1089 Dock Approach Road, between Marshfoot Road roundabout and ASDA roundabout
17	A1089 St Andrews Road, between ASDA Roundabout and Port of Tilbury Gate 1
18	A1089 St Andrews Road, between Tilbury Gate 1 and Consented Tilbury 2 Road
19	Consented Tilbury 2 Road, between A1089 St Andrews Road and Fort Road
20	Fort Road between Consented Tilbury 2 Road and Brennan Road
21	Fort Road between Brennan Road and Coopers Shaw Road

2.1.3 The temporary impact of increased vehicles on the existing road network associated with construction works may affect receptors sensitive to noise. As discussed in Volume 3, Chapter 11: Noise and Vibration, it is not considered that vibration effects from construction traffic will have an adverse effect at sensitive receptors located along affected road links and as such, this has been scoped out of further assessment.

2.1.4 The construction works will result in additional vehicle movements on the existing road network. A high proportion of these additional vehicles will be HGVs and HDVs.

2.1.5 Traffic flows have been provided by the proposed development's transport consultant. Noise change calculations follow the protocol within CRTN. Calculations allow for changes in flow, HGV composition and speed. The noise change assessment has been based on a comparison between the base year (2022) without construction and the base year with peak construction flows. An additional assessment of peak construction flows with cumulative traffic flows from other proposed developments has also been undertaken. The traffic data modelled for the three scenarios are provided in Table 2.2 to Table 2.4 below.

Table 2.2: Traffic flow data – 2022 base year without construction.

Link ID	18 hr Day AAWT			8 hr Night AADT		
	Vehicle Flow	% HGV	Speed (kph)	Vehicle Flow	% HGV	Speed (kph)
1	124968	13.03%	113	18602	12.82%	113
2	107336	14.88%	113	17383	14.38%	113
3	112115	14.05%	113	16964	13.70%	113
4	38805	32.43%	113	6706	30.79%	113
11	1117	23.81%	97	44	9.03%	97
15	109325	10.48%	113	16259	11.82%	113
16	43701	29.44%	113	7189	28.53%	113
17	19970	52.53%	64	3191	50.73%	64
18	8839	42.35%	64	1266	45.05%	64
19	4242	54.21%	97	484	69.40%	97
20	1709	17.29%	97	86	5.42%	97
21	2455	16.68%	97	87	5.94%	97

Table 2.3: Traffic flow data – 2022 base year with peak construction flows.

Link ID	18 hr Day AAWT			8 hr Night AADT		
	Vehicle Flow	% HGV	Speed (kph)	Vehicle Flow	% HGV	Speed (kph)
1	125254	13.14%	113	18633	12.80%	113
2	107622	15.00%	113	17415	14.36%	113
3	112401	14.16%	113	16996	13.68%	113
4	39091	32.61%	113	6738	30.66%	113
11	1403	30.66%	97	75	6.67%	97
15	109611	10.60%	113	16291	11.80%	113
16	43987	29.62%	113	7220	28.42%	113
17	20257	52.60%	64	3222	50.26%	64
18	9125	42.82%	64	1298	44.04%	64
19	4528	54.41%	97	515	65.36%	97
20	1995	23.04%	97	118	4.88%	97
21	2741	20.94%	97	118	5.27%	97

Table 2.4: Traffic flow data – 2022 base year with peak construction and cumulative flows.

Link ID	18 hr Day AAWT			8 hr Night AADT		
	Vehicle Flow	% HGV	Speed (kph)	Vehicle Flow	% HGV	Speed (kph)
1	128464	13.47%	113	18822	12.67%	113
2	110832	15.33%	113	17604	14.21%	113
3	115610	14.50%	113	17185	13.53%	113
4	39816	32.85%	113	6764	30.54%	113
11	1403	30.66%	97	75	6.67%	97
15	112907	11.04%	113	16507	11.65%	113
16	44712	29.88%	113	7247	28.32%	113
17	20717	52.88%	64	3222	50.26%	64
18	9125	42.82%	64	1298	44.04%	64
19	4528	54.41%	97	515	65.36%	97
20	1995	23.04%	97	118	4.88%	97
21	2741	20.94%	97	118	5.27%	97

2.2 Results

2.2.1 Noise change calculations have been undertaken for each of the twelve links where traffic data has been provided. The calculations consider total 18-hour average flows, percentage HGV/HDV and average speed, using the formula from CRTN. The noise changes forecast in Table 2.5 to Table 2.8 represent the expected noise change at any NSR for which that traffic link is already the dominant noise source. For NSRs where a link contributes only a portion towards their overall existing noise environment, the noise change reported for that link forms an upper limit to the noise change which an NSR might experience due to the increased traffic flows.

Table 2.5: Predicted noise change – 2022 base year with no construction against base year with peak construction flows - daytime.

Link ID	Base year without construction ($L_{A10, 18hr}$)	Base year with peak construction flows ($L_{A10, 18hr}$)	Noise change (dB)
1	85.7	85.8	+ 0.1
2	85.3	85.3	0
3	85.4	85.4	0
4	82.6	82.6	0
11	65.3	66.9	+ 1.6
15	84.8	84.9	+ 0.1
16	82.8	82.9	+ 0.1
17	78.0	78.0	0
18	73.7	73.9	+ 0.2
19	73.4	73.7	+ 0.3
20	66.4	67.7	+ 1.3
21	67.9	68.9	+ 1.0

Table 2.6: Predicted noise change – 2022 base year with no construction against base year with peak construction flows – night-time.

Link ID	Base year without construction (L_{night})	Base year with peak construction flows (L_{night})	Noise change (dB)
1	77.5	77.5	0
2	77.3	77.3	0
3	77.2	77.2	0
4	74.8	74.8	0
11	49.4	51.4	+ 2.0
15	76.7	76.7	0
16	74.9	74.9	0
17	69.9	69.9	0
18	65.5	65.5	0
19	64.8	64.9	+ 0.1
20	51.8	53.0	+ 1.2
21	51.9	53.1	+ 1.2

Table 2.7: Predicted noise change – 2022 base year with no construction against base year with peak construction and cumulative flows – daytime.

Link ID	Base year without construction ($L_{A10, 18hr}$)	Base year with peak construction flows and cumulative flows ($L_{A10, 18hr}$)	Noise change (dB)
1	85.7	85.9	+ 0.2
2	85.3	85.5	+ 0.2
3	85.4	85.6	+ 0.2
4	82.6	82.7	+ 0.1
11	65.3	66.9	+ 1.6
15	84.8	85.1	+ 0.3
16	82.8	83.0	+ 0.2
17	78.0	78.2	+ 0.2
18	73.7	73.9	+ 0.2
19	73.4	73.7	+ 0.3
20	66.4	67.7	+ 1.3
21	67.9	68.9	+ 1.0

Table 2.8: Predicted noise change – 2022 base year with no construction against base year with peak construction and cumulative flows – night-time.

Link ID	Base year without construction (L_{night})	Base year with peak construction flows and cumulative flows (L_{night})	Noise change (dB)
1	77.5	77.5	0
2	77.3	77.4	+ 0.1
3	77.2	77.2	0
4	74.8	74.8	0
11	49.4	51.4	+ 2.0
15	76.7	76.8	+ 0.1
16	74.9	74.9	0
17	69.9	69.9	0
18	65.5	65.5	0
19	64.8	64.9	+ 0.1
20	51.8	53.0	+ 1.2
21	51.9	53.1	+ 1.2

2.3 Summary of results

2.3.1 Predictions have shown that during the peak construction period for the proposed development, noise levels will increase on links 11, 20 and 21 by up to 1.6 dB during the day. On all other road links, predicted noise levels will not increase by more than 1 dB during the daytime periods.

2.3.2 Predictions have shown that during the peak construction period for the proposed development, noise levels will increase on links 11, 20 and 21 by up to 2 dB during the night. On all other road links, predicted noise levels will not increase by more than 1 dB during the night-time periods.

2.3.3 Predictions of the cumulative effects from construction traffic associated with Thurrock Flexible Generation Plant and other proposed developments have shown that the greatest noise increase will be seen on link 11 during both the day and the night. However, these highest increases are the same as those predicted as part of the main assessment.

2.3.4 The determination of magnitude of impact at receptors located along the assessed road links as a result of construction traffic associated with the proposed development is detailed in Volume 3, Chapter 11: Noise and Vibration.

3. References

British Standards Institution (BSI) BS 5228-1:2009+A1:2014. Code of practice for noise and vibration control on construction and open sites. Noise. London, BSI.

Department for Transport (1988) Calculation of Road Traffic Noise (CRTN). London, The Stationery Office.